



California Environmental Protection Agency

Department of Pesticide Regulation

Developing Options to Reduce Volatile Organic Compound Emissions from Pesticides



Agenda

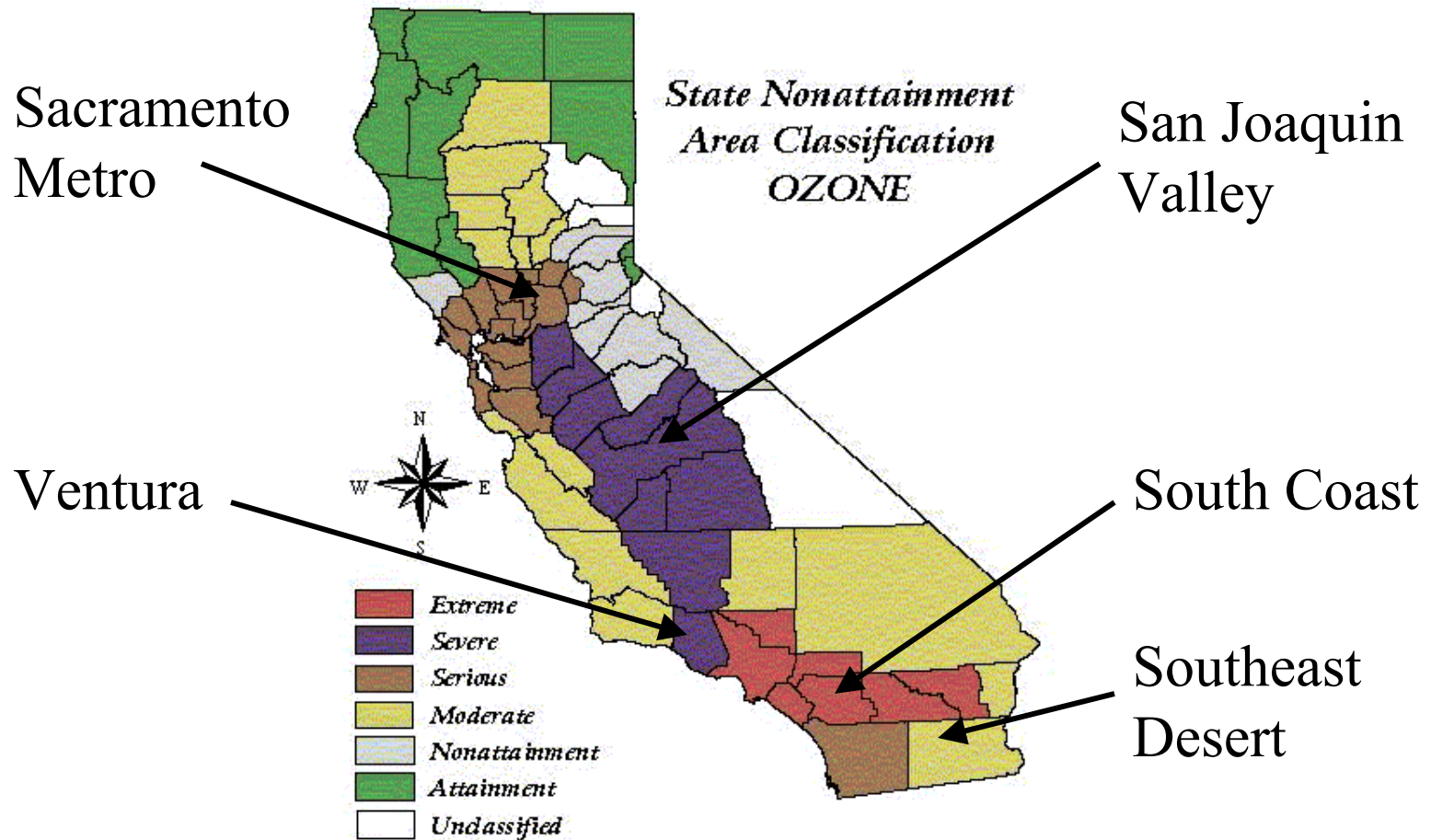
- Introductions
- Background
- Estimates of Pesticide VOC Emissions
- State Implementation Plan Process and Schedule
- Objectives and Organization of Work Group
- Pesticide VOC Reduction Options
- Other Issues



Background

- Volatile organic compounds (VOC) and nitrogen oxides (NO_x) react with sunlight to form ozone
- As required by the Clean Air Act, ARB and Air Pollution Control Districts (APCD) develop State Implementation Plans (SIP) to reduce VOCs and NO_x
- 1994 SIP requires DPR to reduce VOC emissions from pesticides by 20% between 1990 and 2005 in 5 nonattainment areas

Nonattainment Areas





Sources of VOCs (San Joaquin Valley)

Category	1999	2010
Livestock Wastes	7.0%	12.0%
Oil and Gas Production	7.2%	8.6%
Prescribed Burning	6.2%	7.3%
Consumer Products	5.8%	7.3%
Light and Med Duty Trucks	11.0%	7.0%
Agricultural Pesticides	6.0%	6.4%
Light Duty Passenger	11.5%	5.2%
Coatings and Related Solvents	3.0%	4.8%



Method for Estimating VOCs

- DPR maintains an inventory of VOC emissions from agricultural and commercial structural applications of pesticide products
- VOC emission from a pesticide product is:
$$\text{emission} = \% \text{VOC in product} \times \text{amount of product}$$



Estimating %VOC in Products

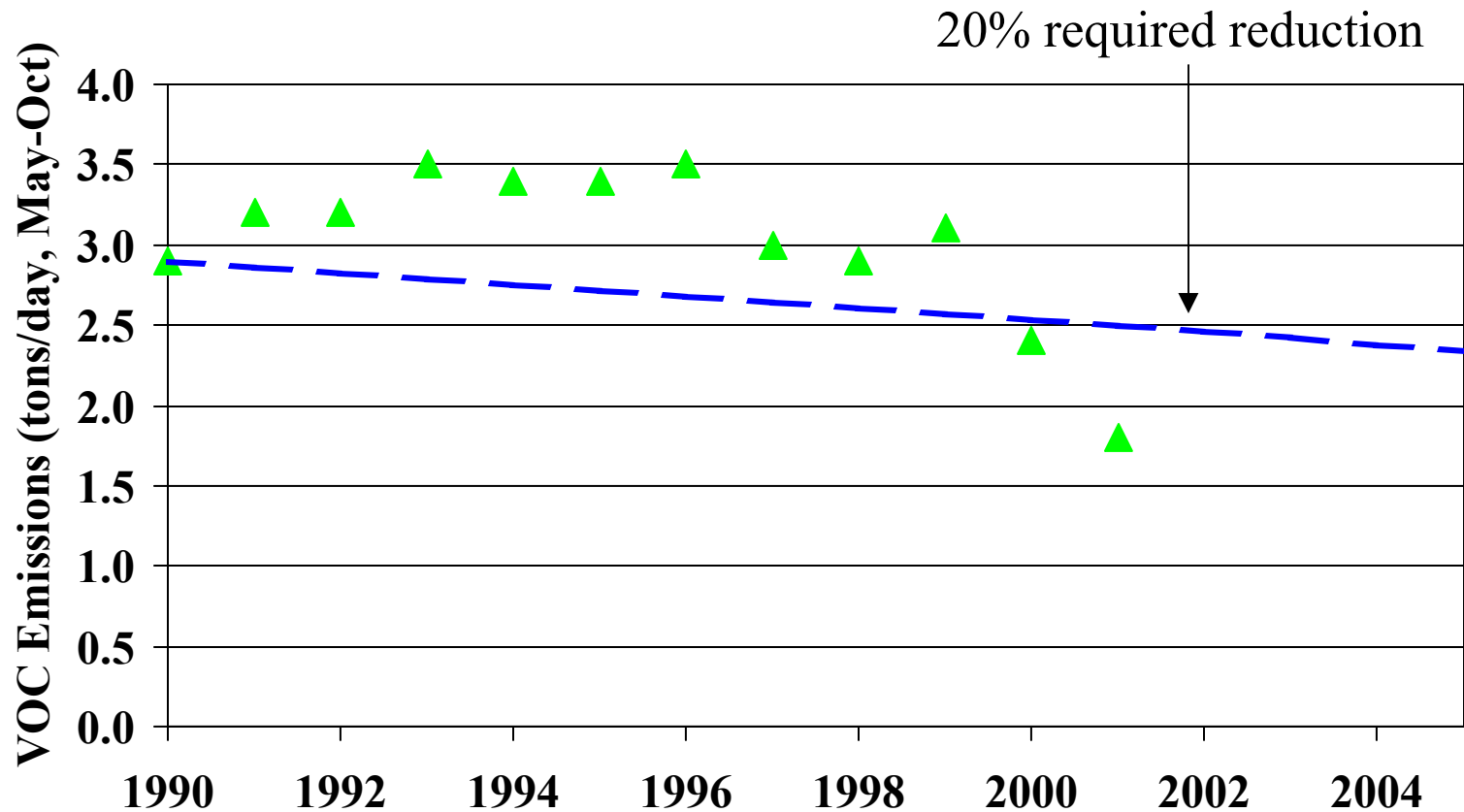
- In 1994, DPR requested %VOC (emission potential) data for all agricultural and structural products
- Emission potential for each product determined by one of four methods:
 - Lab test (thermogravimetric analysis, TGA)
 - Water/Inorganic subtraction
 - Estimated from confidential statement of formula
 - Default value



Emission Inventory Calculations

- Using emission potential data and PUR data, VOC emissions from agricultural and commercial structural applications calculated statewide for all years beginning with 1990 base year.
- Each year of inventory updated annually based on most recent PUR data and emission potential data; approximately 1 year lag
- Inventory focuses on:
 - May – Oct (peak ozone period) for each year
 - 5 nonattainment areas

Sacramento Emission Inventory



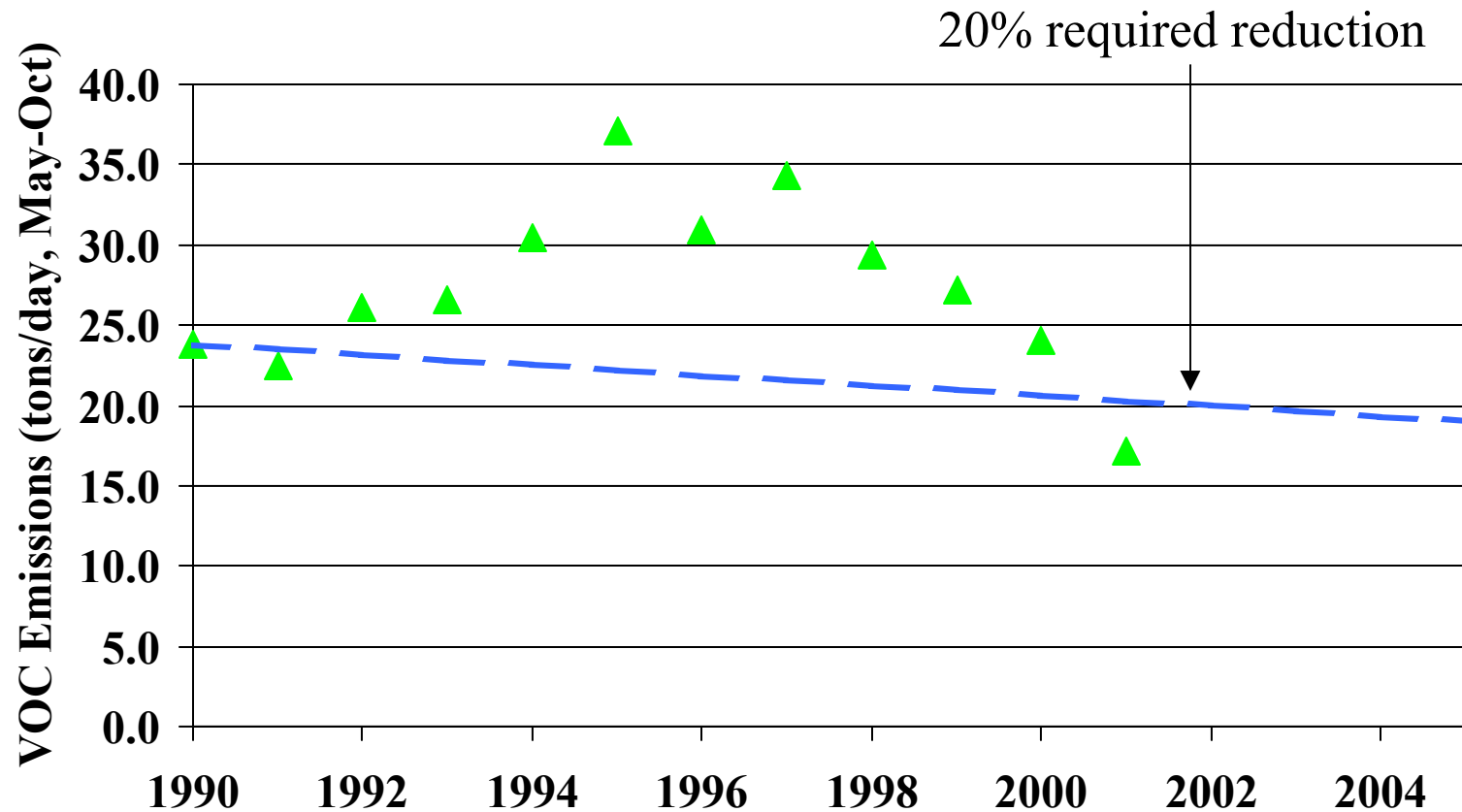


2001 Sacramento Emissions

- Pesticide inventory comprised of
 - 90% agricultural
 - 10% commercial structural
- Products with highest contribution contain
 - Metam-sodium (19%)
 - Molinate (15%)
 - Methyl bromide (6%)
 - Chlorpyrifos (5%)
 - Cypermethrin (4%)



San Joaquin Emission Inventory

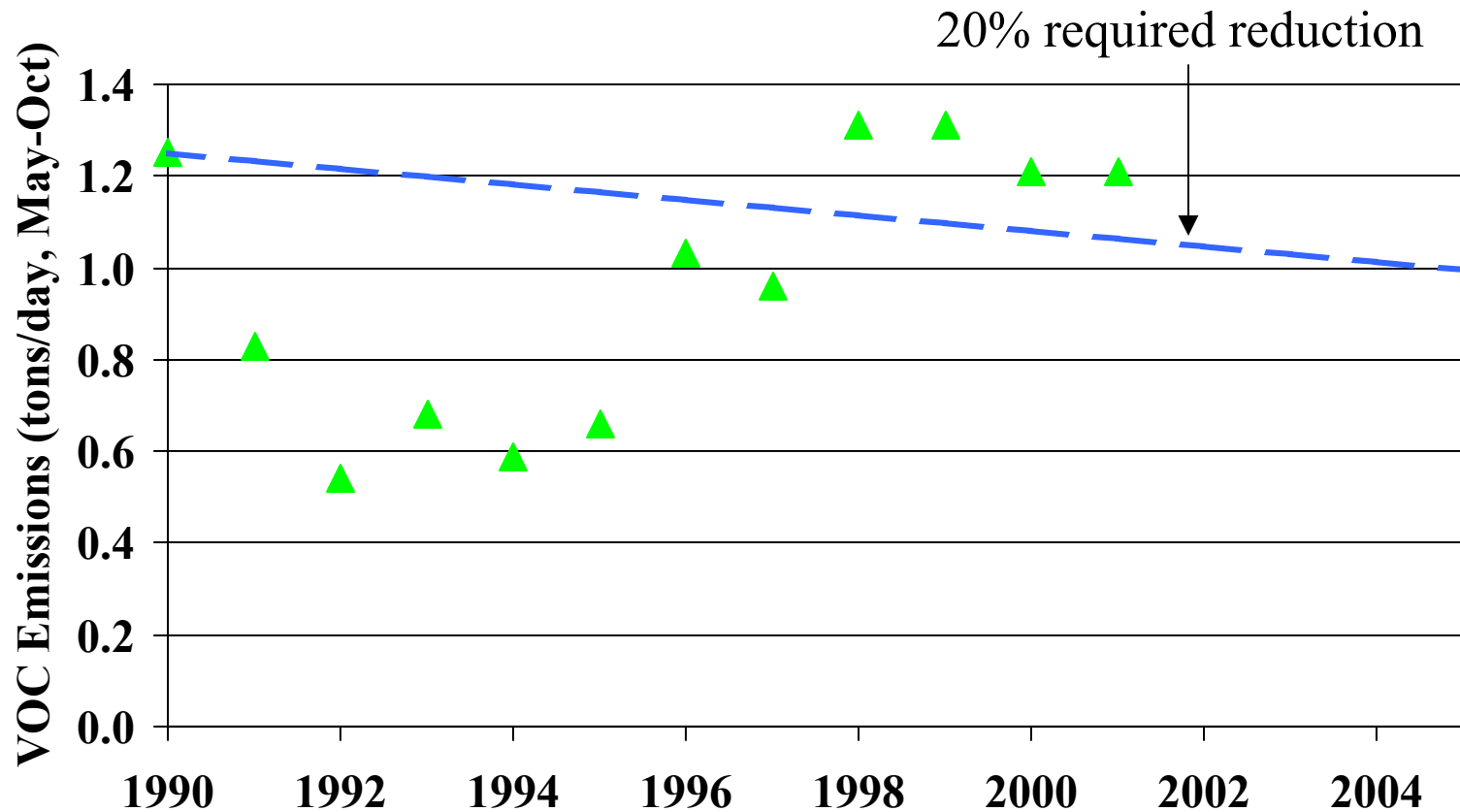




2001 San Joaquin Valley Emissions

- Pesticide inventory comprised of
 - 98% agricultural
 - 2% commercial structural
- Products with highest contribution contain
 - Metam-sodium (24%)
 - Dichloropropene (20%)
 - Methyl bromide (8%)
 - Chlorpyrifos (8%)
 - Oxyfluorfen (3%)

Southeast Desert Emission Inventory



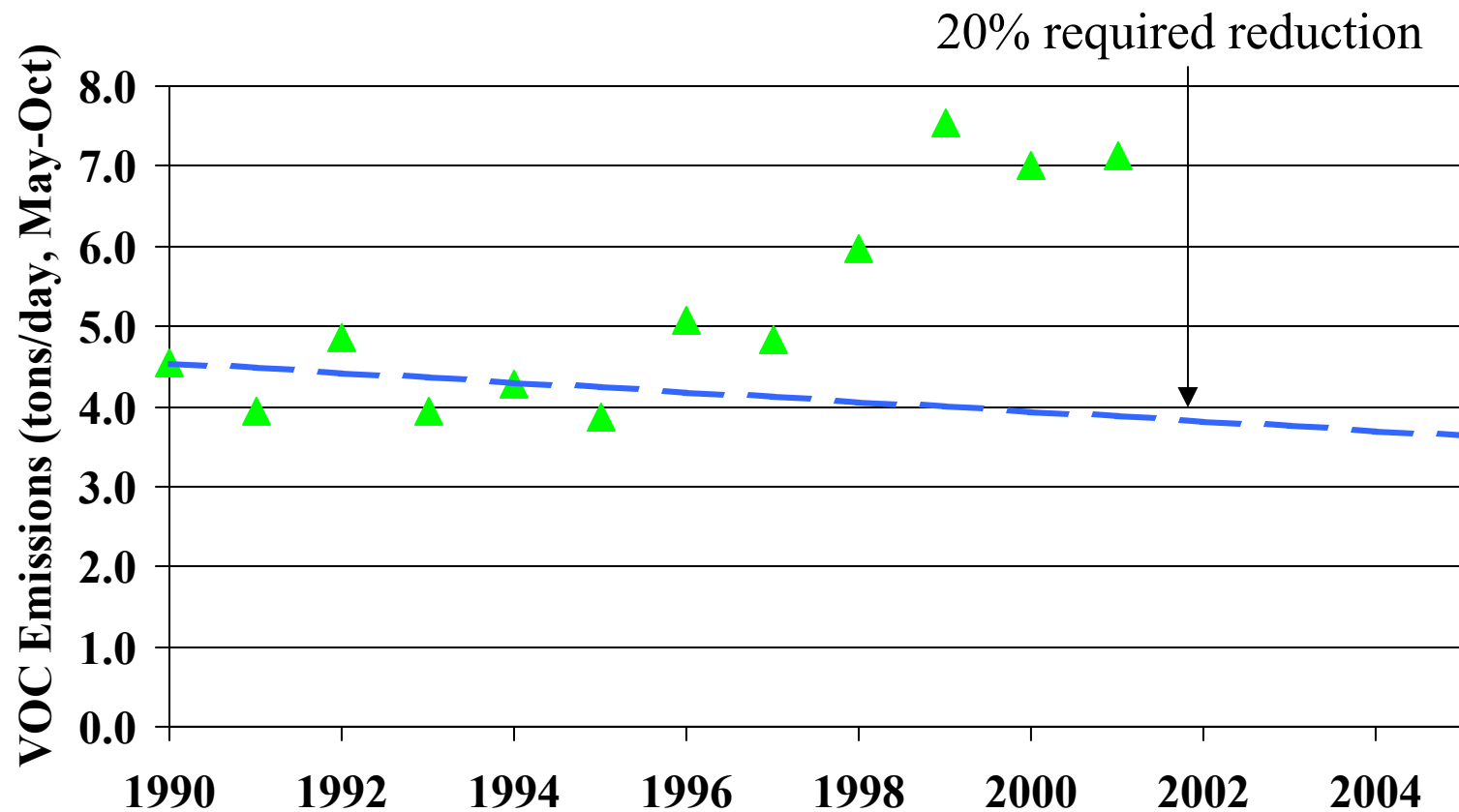


2001 Southeast Desert Emissions

- Pesticide inventory comprised of
 - 96% agricultural
 - 4% commercial structural
- Products with highest contribution contain
 - Metam-sodium (60%)
 - Methyl bromide (17%)
 - Dichloropropene (6%)
 - Gibberellins (2%)
 - Hydrogen cyanamide (1%)



Ventura Emission Inventory



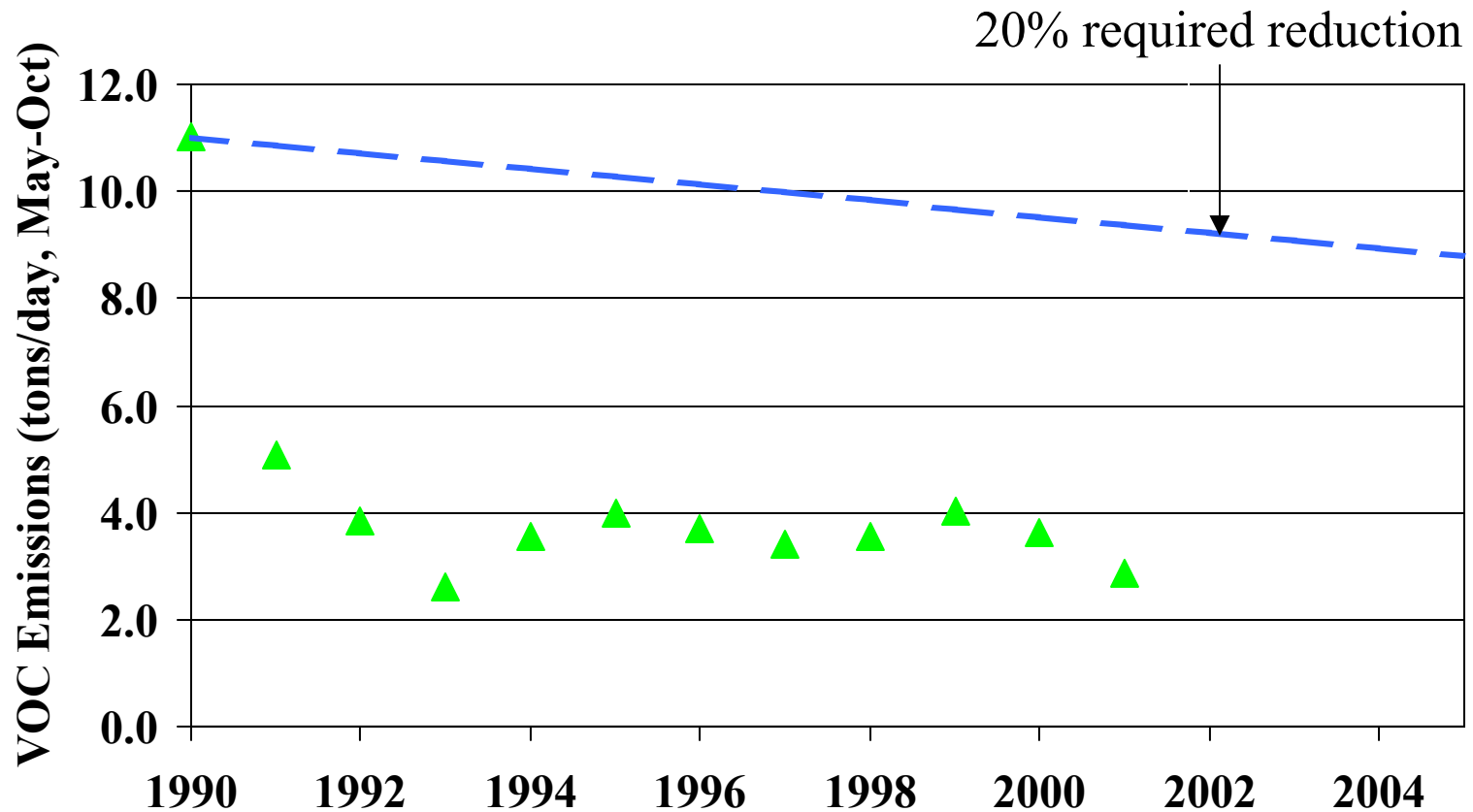


2001 Ventura Emissions

- Pesticide inventory comprised of
 - 99.7% agricultural
 - 0.3% commercial structural
- Products with highest contribution contain
 - Methyl bromide (82%)
 - Dichloropropene (4%)
 - Metam-sodium (3%)
 - Chlorpyrifos (2%)
 - Chloropicrin (2%)



South Coast Emission Inventory





2001 South Coast Emissions

- Pesticide inventory comprised of
 - 57% agricultural

Uncertainties in Emission Inventory

- Uncertainties in pesticide use
- Uncertainties in emission potentials
- Other uncertainties
 - Limited data available to forecast future emissions
 - The proportion of each chemical in the inventory (speciation profile) is uncertain
 - Ability to create ozone (reactivity) for many pesticides is unknown; amount of reactive organic gases (ROG) is the critical parameter



Current Regulatory Activities

- South Coast and San Joaquin Valley will prepare new SIPs in 2003 that will describe measures to achieve air quality standards by 2010
- South Coast will not need any additional VOC reductions from pesticides
- San Joaquin Valley will need approximately 30% more VOC reduction from all sources between 2005 and 2010



SIP Process and SJ Schedule

- Complete draft emissions inventory: Feb 2003
- Complete draft control measures: Jul 2003
 - Black box
- Complete draft modeling: Sep 2003
- Complete draft plan: Sep 2003
- Conduct workshops: Aug – Oct 2003
- Review and approve plan
 - APCD approval: Dec 2003
 - ARB approval: Mar 2004
 - EPA approval: Sep 2004
- Identify black box measures: 2006 – 07

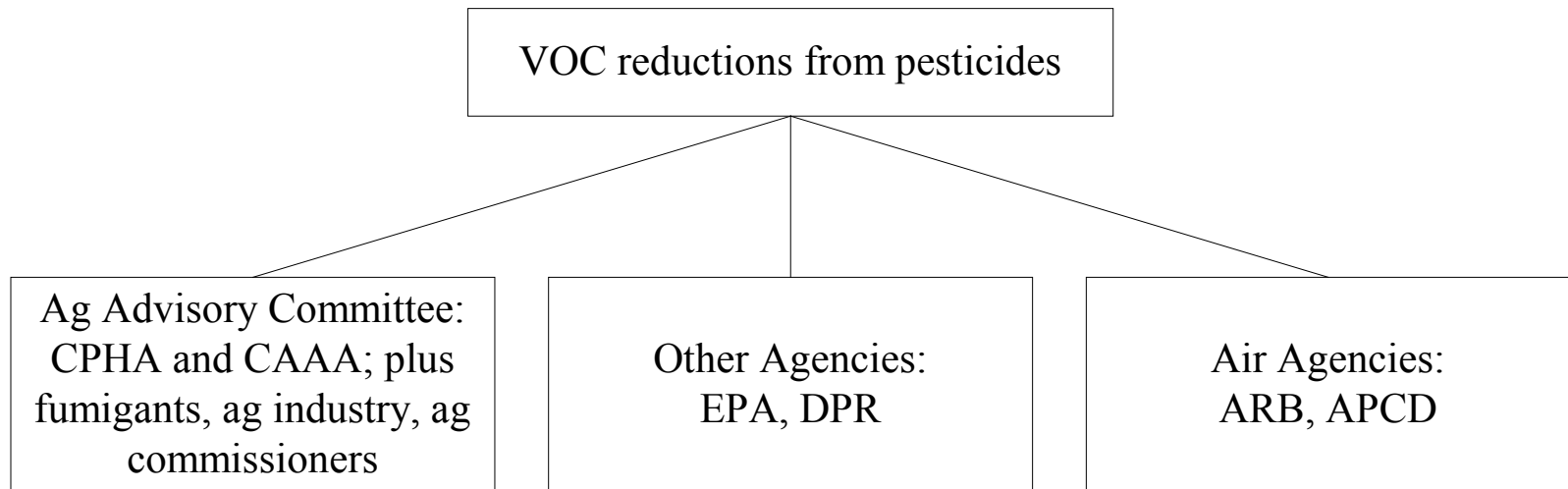


Objectives of Work Group

- Identify possible options for reducing VOC emissions from pesticides
- Evaluate feasibility of reduction options
- Select reduction options for incorporation into State Implementation Plans



Partners in Reducing Emissions





Possible VOC Reduction Options

- Pesticide Registrant Options
 - Change product formulations to decrease VOCs
 - Decrease application rates
 - New application technology to reduce emissions
 - Discontinue high emission uses
 - Federal pesticide registration activities



Possible VOC Reduction Options

- Fumigant Options
 - Use deeper injection
 - Change tarping practices
 - Limits on amount used
 - Adjust soil moisture to reduce emissions
 - Develop capture systems (post-harvest fumigations)



Possible VOC Reduction Options

- Pesticide User Options
 - Reduce volume or acreage treated
 - Limit applications in high ozone areas
 - Modify cultural practices to reduce emissions
 - Use alternative pesticides with lower emissions



VOC Reduction Evaluation

- For each option
 - Classify as voluntary or regulatory
 - Identify party responsible for development
 - Estimate amount of reduction
 - Determine if technically feasible
 - Estimate cost of reduction
 - Identify positive and negative side effects
 - Estimate time to implement
 - If necessary, determine regulatory feasibility
 - Determine if feasible to track reduction with inventory



Other Issues for Discussion

- ARB Modeling Methods
- Triggers/Criteria for Regulatory Measures
- Long Term Emission Inventory Changes
 - More accurate emission potential data
 - More detailed speciation profiles
 - More accurate reactivity estimates
 - Actual emission rates
 - Forecasting methods